White oak group

White oak, *Quercus alba*
Bur oak, Quercus macrocarpa
Swamp white oak, Quercus bicolor

The **volume of white oak has increased** significantly since 1983 due mainly to an increase in the number of larger trees. The number of saplings and poles has decreased in the last ten years possibly indicating a decreasing trend in sawtimber volume in the future.

Rates of growth and mortality have increased but mortality is still lower than average for all species. Whereas white oaks make up about 5% of volume and growth in Wisconsin, they account for only 2.8% of mortality.

White oak is **an important timber species**, accounting for 3% of roundwood production in 2003 and 4% of removals in 2008. The density of white oak wood is very high and may make it a valuable species for biomass production.

- *How has the white oak resource changed?*
  Growing stock volume and diameter class distribution: 1983, 1996, and 2008
- *Where does white oak grow in Wisconsin?*
  Growing stock volume by region with map
- *How fast is white oak growing?*
  Average annual net growth by region and year: 1983, 1996, and 2008
- *How healthy is white oak in Wisconsin?*
  Average annual mortality: 1983, 1996, and 2008
- *How much white oak do we harvest?*
  Roundwood production by product and year: 1997, 2003, and 2006
- *How much is white oak selling for?*
  Prices for cordwood and sawtimber: 2000 to present
- *How much white oak biomass do we have?*
  Oven-dry tons of biomass by region of the state: 2008

"How has the white oak resource changed?"

Growing stock volume and diameter class distribution by year

The growing stock volume of white oaks in 2008 was approximately 1.0 billion cft or about 5% of total statewide volume (Chart 1). Volume has **increased 65% since 1983**.

Growing stock volume in all size classes has increased since 1983 but especially in larger trees (Chart 2). The volume in small trees (5 to 13 inches) has decreased since 1996 while volume in large trees (over 13 inches) has increased by 33% in the same period.

The number of seedlings and sawtimber trees has increased since 1996 for all species except swamp white oak (Chart 3). The number of saplings and poles, however, has decreased.

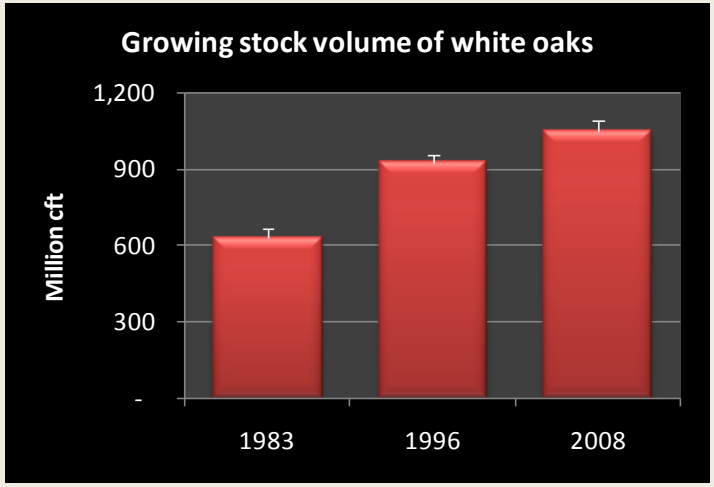


Chart 1. Growing stock volume (million cubic feet) by inventory year.
Source: USDA Forest Inventory and Analysis data: 1983, 1996, and 2008.

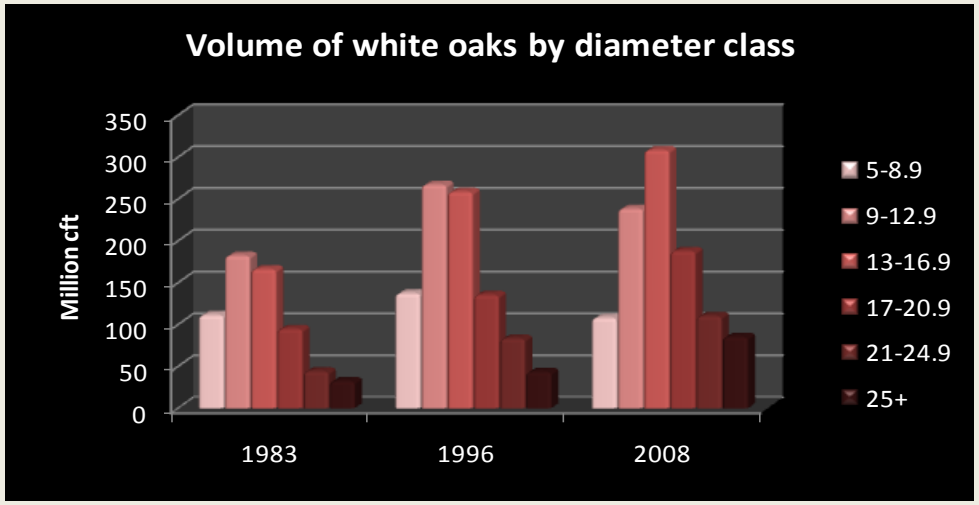


Chart 2. Growing stock volume (million cubic feet) in 1983, 1996, and 2008.
Source: USDA Forest Inventory and Analysis data: 1983, 1996, and 2008.

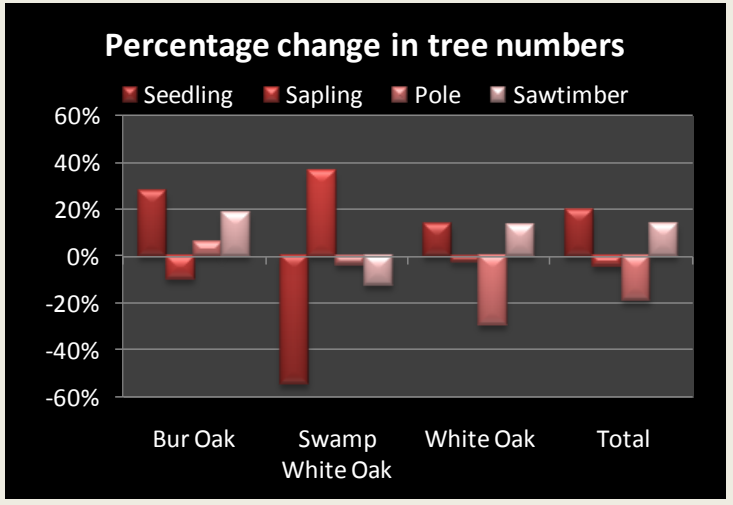
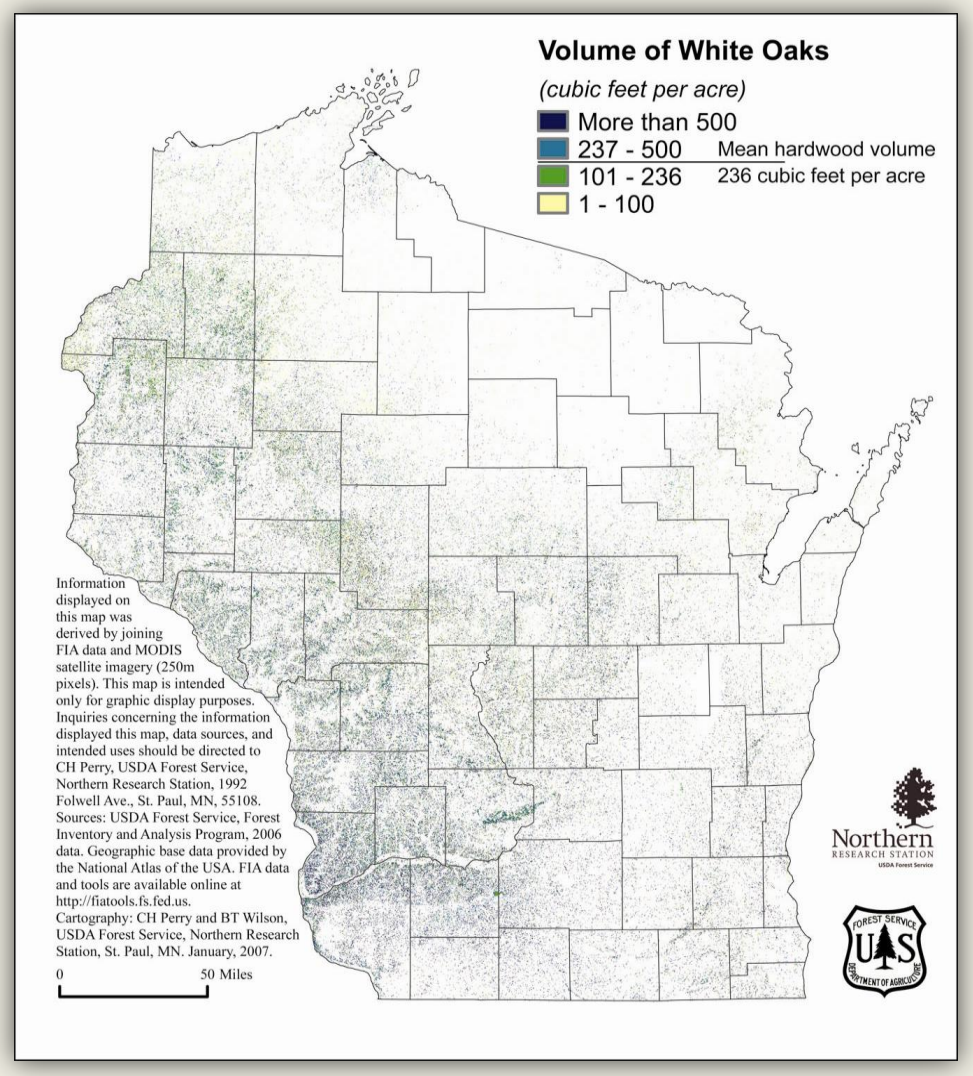


Chart 3. Percentage change in the number of live trees by size class between 1996 and 2008.
Source: USDA Forest Inventory and Analysis data 1996, and 2008.

"Where do white oaks grow in Wisconsin?"

Growing stock volume by region with map



The great majority, 69% of the white oak group is white oak with bur oak making up most of the remainder (Table 1).

White oaks occur throughout Wisconsin but are much more common in the western and central parts of the state. The northeast has only 3% of all white oak volume. The majority of white oak occurs on the oak hickory forest type.

Table 1. Growing stock volume (million cft) by species and region of the state.

Species	Central	North east	North west	South east	South west	Total	Percent of total
Bur oak	54	8	71	67	94	294	**28%**
Swamp white oak	9	2	4	5	9	28	**3%**
White oak	234	17	81	122	269	723	**69%**
Total white oaks	297	27	155	195	373	1,046	**100%**
Percent of total	**28%**	**3%**	**15%**	**19%**	**36%**	**100%**	

Source: USDA Forest Service, Forest Inventory and Analysis 2008 data

Additional tables:
Volume by county in 2008 (pdf; Excel)

"How fast are white oaks growing?"

Average annual net growth by region and year

Average annual net growth of white oaks is about 24.5 cft/yr, representing 4% of statewide volume growth (Chart 4). Growth rates have increased 114% since 1983 and about 47% since 1996.

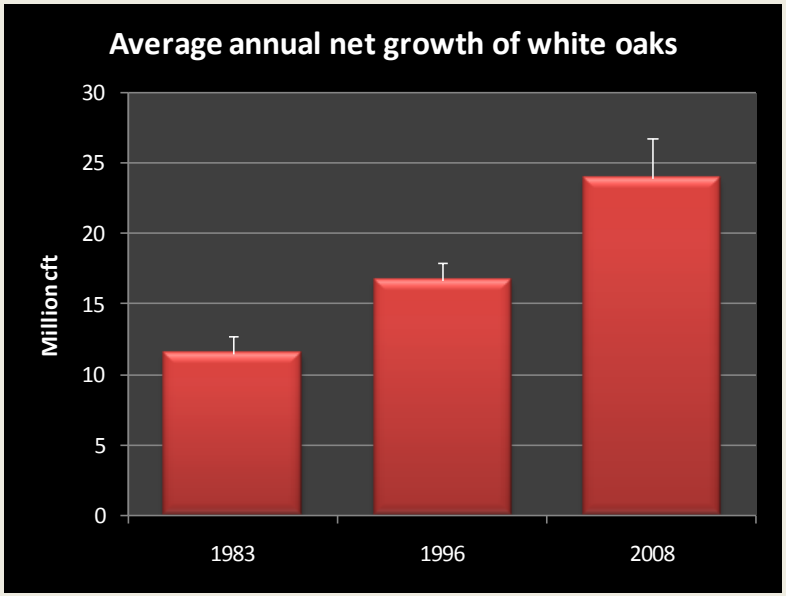


Chart 4. Average annual net growth (million cubic feet).
Source: USDA Forest Inventory & Analysis data: 1983, 1996, 2008

Table 2. Average annual net growth (million cft/year) of growing stock and the ratio of growth to volume by region of the state.

Region	Net growth	Percent of Total	Ratio of growth to volume
Central	6.5	27%	**2.2%**
Northeast	0.8	3%	**3.0%**
Northwest	4.5	19%	**2.9%**
Southeast	5.6	23%	**2.9%**
Southwest	6.6	27%	**1.8%**
Statewide	**24.0**	**100%**	**2.3%**

Source: USDA Forest Inventory and Analysis 2008

The average statewide ratio of growth to volume for white oaks is 2.3%, lower than the statewide average of 2.8% for all species (Table 2).

Additional tables:
Average annual growth, mortality and removals by region (Pdf, Excel).

"How healthy are white oaks in Wisconsin?"

Average annual mortality: 1983, 1996, and 2008

Average annual mortality of white oaks, about 5.7 million cft per year in 2008, has almost **tripled since 1996** (Chart 5). However, the percent of statewide mortality is less than the percent of volume; white oaks account for 5.0% of total growing stock volume in the state but only 2.8% of total mortality.

The ratio of mortality to gross growth is 19% for white oaks, **much lower than the statewide average** of 26% for all species (Table 3).

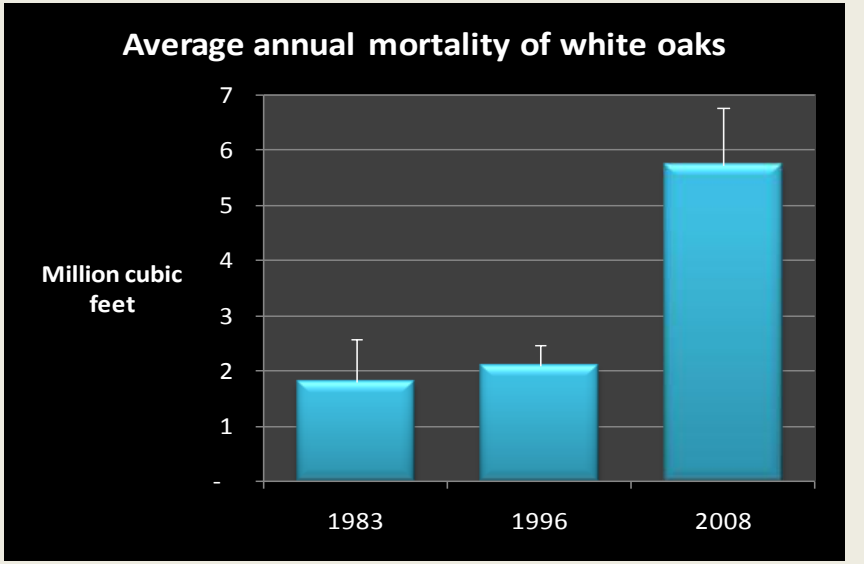


Chart 5. Average annual mortality (million cubic feet) by inventory year.
Source: USDA Forest Inventory & Analysis data: 1983, 1996, and 2008

Table 3. Mortality, gross growth and the ratio of mortality to gross growth.

Species	Average annual mortality (cft)	Average annual gross growth (cft)	Mortality / growth
Bur oak	2,179,510	8,806,710	**25%**
Swamp white oak	94,811	823,984	**12%**
White oak	3,462,077	20,089,498	**17%**
Total white oaks	**5,736,398**	**29,720,192**	**19%**

Source: USDA Forest Inventory & Analysis data: 2008

Additional tables:
Average annual growth, mortality and removals by region (Pdf, Excel).

"How much white oak do we harvest?"

Roundwood production and removals by product and year

In 2003, white oak accounted for 12.4 million cft or about 3% of Wisconsin's total roundwood, about half in sawlogs and a quarter each in fuelwood and pulpwood (Chart 6).

From 2003 to 2006, pulpwood production decreased by 1.6 million cft or 55%. White oak supplies 1.3 million cft or 1% of total pulpwood production.

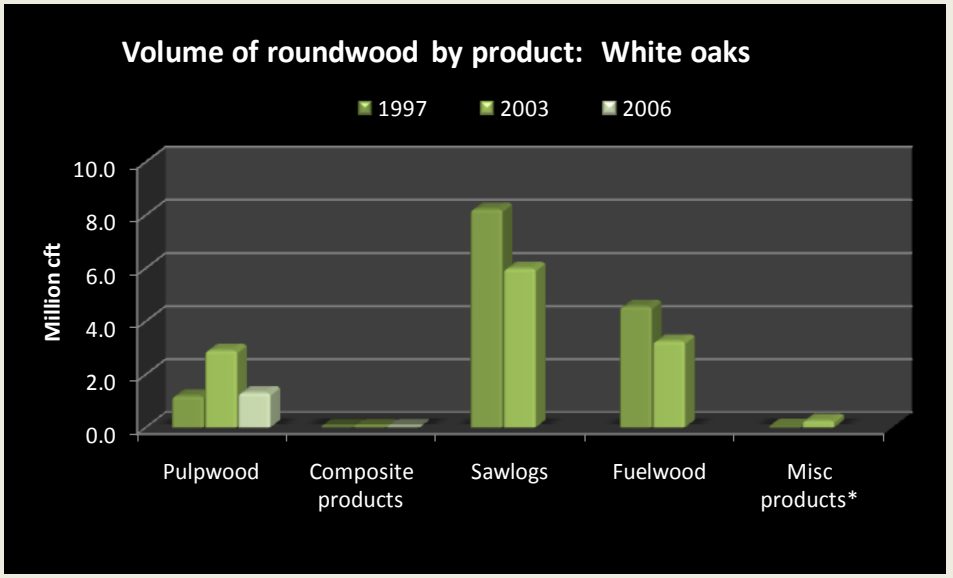


Chart 6. Volume of roundwood products. The most recent numbers for pulpwood and composite products are from 2006 and the most recent numbers for sawlogs, fuelwood and miscellaneous products are from 2003 (Ron Piva).
* Miscellaneous products include poles, posts, pilings and veneer.
Source: Timber Products Output Mapmaker, http://ncrs2.fs.fed.us/4801/fiadb/rpa_tpo/wc_rpa_tpo.ASP

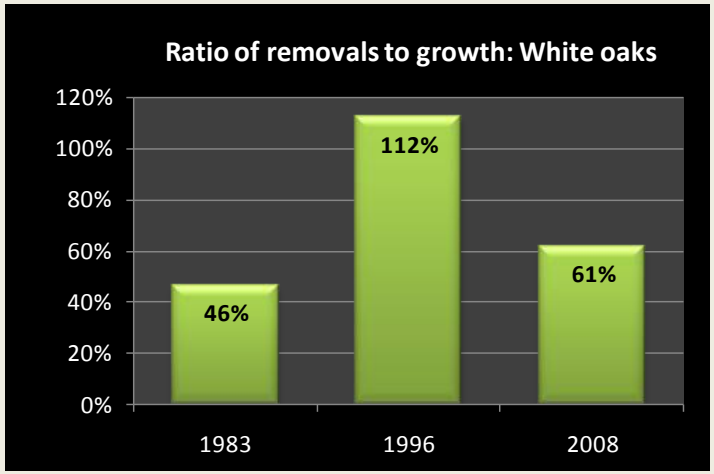


Chart 7. Ratio of volume harvested annually to net growth.
Source: USDA Forest Inventory & Analysis data: 1983, 1996, and 2008.

The ratio of removals to net growth is 61% for white oaks, slightly higher than the statewide average ratio of 56% (Chart 7). The ratio of growth to removals has fallen 61% from 1996. Between 1996 and 2004-2008, white oak removals decreased by 21% while growth increased 47% in the same time period.

Additional tables:
Average annual growth, mortality and removals by region (Pdf, Excel).

"How much is white oak selling for?"

Prices for pulpwood & sawtimber: 2000 to present

Due to the variability of timber prices from year to year and region to region, two methods of reporting prices are presented here: Timber Mart North and weighted average stumpage prices from Wisconsin Administrative Code Chapter NR 46.

Stumpage prices for sawtimber, as reported in the Timber Mart North (Chart 8), have decreased since 2000.

Average weighted stumpage values for both cordwood and logs (Table 4) peaked in 2006 and have decreased since.

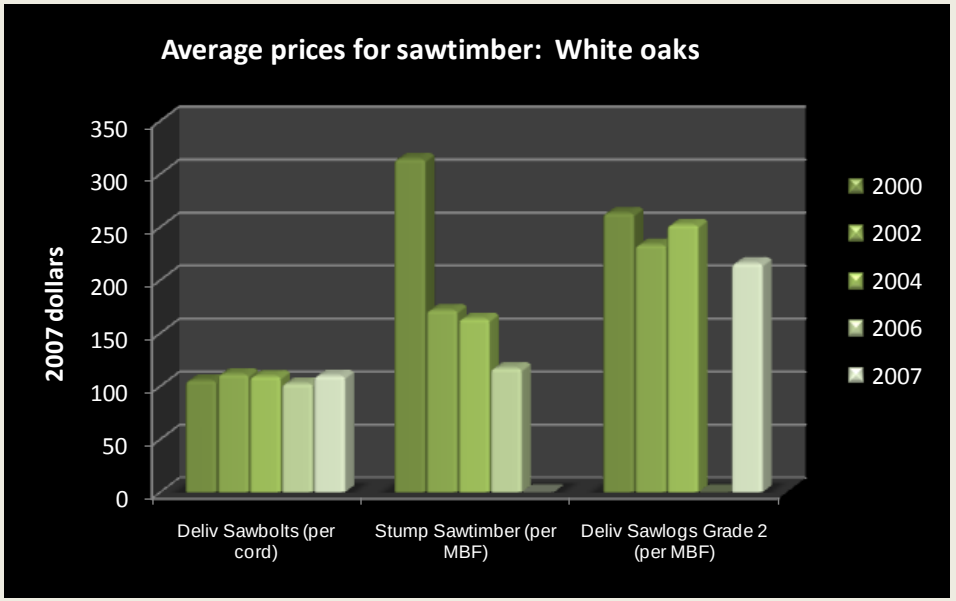
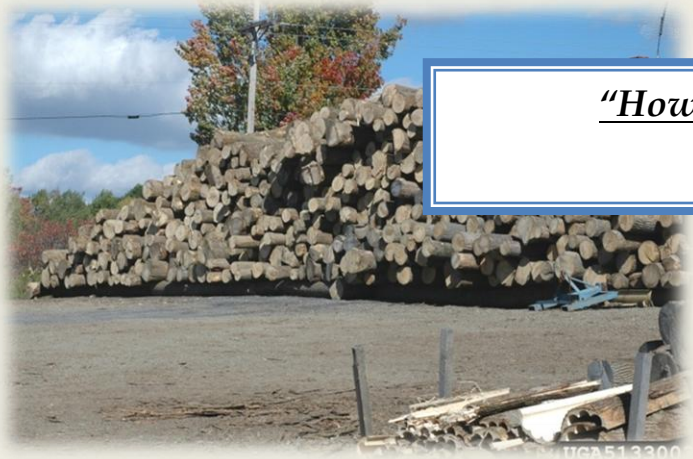


Chart 8. Average prices for cordwood and sawtimber (2007).
Source: Timber Mart North, George Banzhaf & Company, 8301 N. Allen Lane, Milwaukee, WI 53217

Table 4. Average weighted stumpage prices (adjusted for inflation to 2008 dollars per MBF) by year for Wisconsin.

Product	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average for all hardwoods
Cordwood (per cord)	-	-	-	$17	$23	$15	$32	$23	NA	**$14**	$19
Logs (per MBF)	$229	$205	$216	$197	$202	$198	$281	$204	$163	**$117**	$140

Source: Wisconsin Administrative Code Chapter NR46, 2000 to 2008



"How much white oak biomass do we have?"

Oven-dry tons by region of the state

There were 38.2 million oven-dry tons (ODT) of white oak biomass in 2008, a decrease of 1.8 million ODT or 5%, from 1996. This species represents only 6.4% of all live biomass statewide. As with volume, most white oak biomass is located in southwest and cetnral Wisconsin (Chart 9).

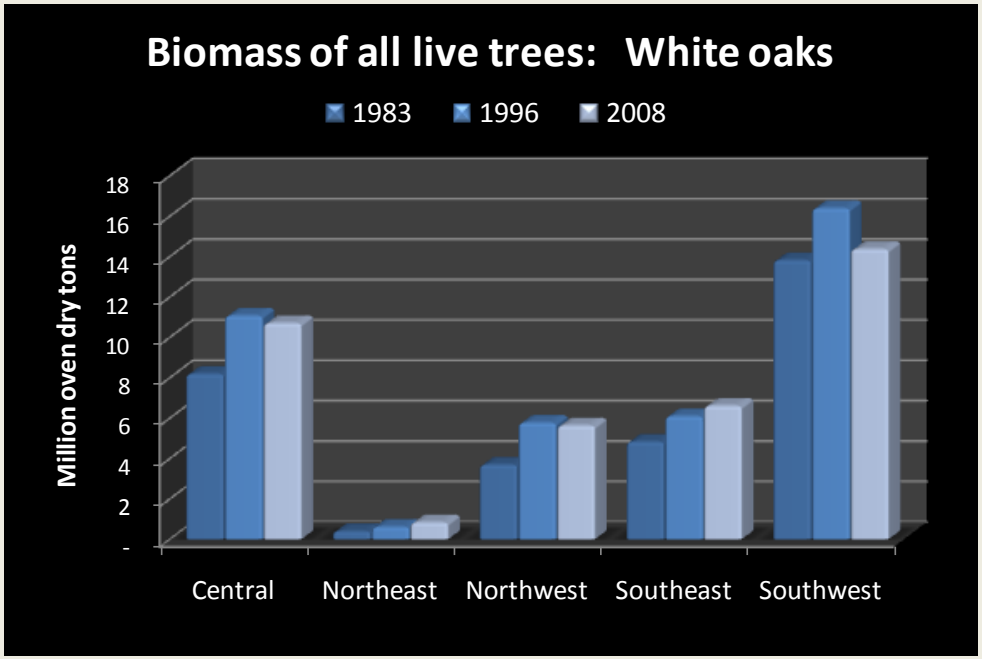


Chart 9. Biomass (million oven-dry tons) by year and region.
Source: USDA Forest Inventory & Analysis data: 1983, 1996, and 2008

The density of white oak wood is much higher than average with a ratio of biomass to volume of 58.8 oven-dry lbs. per cubic foot, second only to red oak. The average for all hardwoods is about 50.1 ODP/cft and for all species is 46.8 ODP/cft.

Approximately, 78% of all white oak biomass is located in the main stem and 18% in the branches.

Additional tables:
Biomass by county in 2008 (pdf; Excel)